

# Table of Contents

## Preface and Committees and Sponsors

## Keynote Presentations

<b>A Full-Field Stress Based Damage Assessment Approach for <i>In Situ</i> Inspection of Composite Structures</b>	
J.M. Dulieu-Barton, R.K. Fruehmann and S. Quinn	3
<b>Damage Assessment of Structures Using only Post-Damage Vibration Measurements</b>	
C. Surace	11

## Chapter 1: Composite Materials

<b>Simulation of Impact Damage in Foam-Based Sandwich Composites</b>	
D.S. Feng and F. Aymerich	25
<b>Identification of Composite Delamination Using the Krawtchouk Moment Descriptor</b>	
W.Z. Wang, D.Z. Wang, J.E. Mottershead and G. Lampeas	33
<b>Effect of Plate Curvature on Blast Response of Carbon/Epoxy Composite</b>	
V.A. Phadnis, P. Kumar, A. Shukla, A. Roy and V.V. Silberschmidt	41
<b>Ultrasonically Assisted Drilling: Machining towards Improved Structural Integrity in Carbon/Epoxy Composites</b>	
V.A. Phadnis, F. Makhadmeh, A. Roy and V.V. Silberschmidt	49
<b>Changes in the Dynamic Behaviour of Carbon Fibre Reinforced Polymer Elements with Increasing Damage</b>	
R. Capozucca and V. Maccioni	56
<b>A Simulation-Based Monitoring of a Composite Plate Using an Integrated Vibration Measurement System</b>	
P. Kostka, A. Filippatos, R. Höhne and W. Hufenbach	64
<b>Damage Detection in Composite Materials Using Airborne Acoustics</b>	
M.R. Pearson, M.J. Eaton, E. Szigeti, R. Pullin, A. Clarke, R. Burguete and C.A. Featherston	72
<b>Automated Damage Detection in Composite Components Using Acoustic Emission</b>	
R. Pullin, M.R. Pearson, M.J. Eaton, C.A. Featherston, K.M. Holford and A. Clarke	80
<b>Consumed Fatigue Life Assessment of Composite Material Structures by Optical Surface Roughness Inspection</b>	
P. Zuluaga-Ramírez, M. Frövel, R. Restrepo, R. Trallero, R. Atienza, J.M. Pintado, T. Belenguer and F. Salazar	88
<b>Investigation of Nonlinear Vibro-Acoustic Wave Modulation Mechanisms in Composite Laminates</b>	
L. Pieczonka, W.J. Staszewski and T. Uhl	96
<b>Investigation of Dynamic Fracture Behavior of Graphite</b>	
L. Peroni, M. Scapin, F. Carra and N. Mariani	103
<b>Numerical Procedures for Damage Mechanisms Analysis in CFRP Composites</b>	
F. Caputo, D.F. Gennaro, G. Lamanna, A. Lefons and A. Riccio	111
<b>Mechanical Characterization of Hybrid (Organic-Inorganic) Geopolymers</b>	
G. Lamanna, A. Soprano, F. Bollino and M. Catauro	119
<b>Non-Destructive Investigation of Glass Fiber Reinforced Composites via Magnetic Resonance Imaging</b>	
F. Wetterling, K.H. Mok, C. McGoldrick and B. Basu	126

## Chapter 2: Damage in Civil Infrastructure

<b>Development of a Remote Collaborative Visual Inspection System for Road Condition Assessment</b>	
A. Miyamoto	135

<b>Polymeric Bearings – A New Base Isolation System to Reduce Structural Damage during Earthquakes</b>	
T. Falborski and R. Jankowski	143
<b>Symptom-Based Reliability Analysis and Remaining Service Life Prediction of Deteriorating RC Structures</b>	
T.L. Huang and H.P. Chen	151
<b>Finite Element Analysis for Structural Performance of Offshore Platforms under Environmental Loads</b>	
S.E. Abdel Raheem and E.M.A. Abdel Aal	159
<b>Identifying Dynamic Characteristics of a Short-Span Viaduct from Vehicle-Induced Vibrations Considering Different Pavement and Parapet Conditions</b>	
K.C. Chang and C.W. Kim	167
<b>NDT Data Fusion for the Enhancement of Defect Visualization in Concrete</b>	
P. Cotič, E. Niederleithinger, V. Bosiljkov and Z. Jagličić	175
<b>Monitoring of Changes in Bridge Response Using Weigh-In-Motion Systems</b>	
D. Cantero, A. González and B. Basu	183
<b>Innovative Strategy to Reduce the Seismic Vulnerability of a RC Existing Building: Assessment and Retrofitting</b>	
D. Cancellara, F. de Angelis, M. Modano and V. Pasquino	191
<b>Impact of Road Profile when Detecting a Localised Damage from Bridge Acceleration Response to a Moving Vehicle</b>	
D. Hester and A. González	199
<b>Probabilistic Modelling of the Deterioration of Reinforced Concrete Port Infrastructure</b>	
T.C.K. Molyneaux, D.W. Law, F. Collins, F. Blin, R. Zou and K. Siamphukdee	207
<b>Investigating the Use of Moving Force Identification Theory in Bridge Damage Detection</b>	
C.H. Carey, E.J. O'Brien and J. Keenahan	215
<b>Testing and Monitoring for a Large Scale Truss Bridge Using Long-Gauge Fiber Optic Sensors</b>	
C.F. Wan, W. Hong, Z.S. Wu and T. Sato	223
<b>Evaluation of Timber-Concrete Floor Performance under Occupant-Induced Vibrations Using Continuous Monitoring</b>	
P. Omenzetter, V. Kohli and Y. Desgeorges	230
<b>The Concept of Buildings Stability Monitoring and Damage Diagnostics</b>	
V. Volkovas	238
<b>The Impact of the Gigacycle Fatigue on Steel Bridges</b>	
C.S. Bandara and R. Dissanayake	246
<b>Damage Variation in Highway Bridge Piers for Rehabilitation with Different Reinforced Options</b>	
C.M. Gómez-Soberón, B. Olmos-Navarrete, M. Jara-Díaz and J.M. Jara-Guerrero	254
<b>A Parametric Study of a Drive by Bridge Inspection System Based on the Morlet Wavelet</b>	
P.J. McGetrick and C.W. Kim	262
<b>On the Seismic Performance of Elevated Water Tanks and their Control Using TLDs</b>	
A.D. Ghosh, S. Bhattacharyya and A. Roy	270
<b>Sustainable Design of Smart Health Facilities in Seismically Prone Areas</b>	
C. Rainieri and G. Fabbrocino	278
<b>Rapid Assessment of Natural Periods of Large Short-Period Civil Engineering Structures</b>	
V. Pakrashi, B. Basu and K. Ryan	286
<b>Seismic Damage Assessment of Regular Gravity Design Buildings</b>	
C. Negulescu, K.K. Wijesundara and E. Foerster	294
<b>Re-Anchorage of a Ruptured Tendon in Bonded Post-Tensioned Concrete Beams: Model Validation</b>	
A.O. Abdelatif, J.S. Owen and M.F.M. Hussein	302
<b>Post-Earthquake Damage Assessment Process and Problems in Turkey – A Case Study in Van Province</b>	
D.G. Yilmaz, J. von Meding and G.K. Erk	310
<b>Pedestrian Timber Bridges: Experimental Investigation and Modelling</b>	
S. Casciati, L. Faravelli and D. Bortoluzzi	319

<b>The Sensitivity of Vibration Characteristics of Reinforced Concrete Beams under Incremental Static and Cyclic Loading</b>	
W.I. Hamad, J.S. Owen and M.F.M. Hussein	327
<b>PolyVinylidene Fluoride (PVDF) Material Based Energy Harvesting from Train and Damaged Bridge Interaction</b>	
P. Cahill, N. Jackson, A. Mathewson and V. Pakrashi	335
<b>Dynamic Testing and Long Term Monitoring of a Twelve Span Viaduct</b>	
X.H. Chen, P. Omenzetter and S. Beskhyroun	342
<b>Control Performance Evaluation to Avoid Pounding of Bridges</b>	
G.H. Heo, C.G. Kim, S.G. Jeon and E.J. Kim	350
<b>Assessment of Structural Reliability of Bridge Beams Based on Measured Symptoms</b>	
A. Quattrone, E. Matta, L. Zanotti Fragonara, R. Ceravolo and A. de Stefano	358
<b>A Seismic Reliability Assessment of Reinforced Concrete Integral Bridges Subject to Corrosion</b>	
M.N. Choine, A. O'Connor and J.E. Padgett	366
<b>Diagnosis of Damage in a Steel Tank with Self-Supported Roof through Numerical Analysis</b>	
D. Buracki, M. Wójcik and R. Jankowski	374
<b>Evaluating the Structural Capacity of Concrete Elements through <i>In Situ</i> Instrumentation</b>	
D. Byrne and J. Goggins	382
<b>Non-Destructive Tests for the Structural Assessment of a Historical Bridge over the Tua River</b>	
I. Valente, L.F. Ramos, K. Vasquez, P. Guimarães and P.B. Lourenço	390
<b>Experimental Analysis of Bending and Axial Crush Behaviour of Single Hat Longitudinal Rail</b>	
N.A. Husain and C.L. Pang	398
<b>On the Assessment of Fatigue Damage in Railway Bridges</b>	
D.W. O'Dwyer	406

### **Chapter 3: Damage in Machineries**

<b>Failure Stress in Notched Paper Sheets</b>	
C.A. Mora Santos, O. Susarrey Huerta, V. Flores Lara, J. Bedolla Hernández and M.A. Mendoza Nuñez	417
<b>Spectral-Based Fatigue Assessment of Ball Grid Arrays under Aerospace Vibratory Environment</b>	
L.B. Fekih, G. Kouroussis and O. Verlinden	425
<b>Detection of Bearing Spalling Faults Using IAS Monitoring System - Experimental Studies on the Influence of Operating and Environmental Parameters</b>	
A. Bourdon, H. André and D. Rémond	433
<b>Stochastic Modeling of Time Series with Application to Local Damage Detection in Rotating Machinery</b>	
J. Obuchowski, A. Wylomanska and R. Zimroz	441
<b>Gear Fault Diagnosis Using Synchro-Squeezing Transform Based Feature Analysis</b>	
B. Hazra and S. Narasimhan	449
<b>Modal Strain Energy Based Damage Detection Applied to a Full Scale Composite Helicopter Blade</b>	
F.L.M. dos Santos, B. Peeters, H. van der Auweraer and L.C. Sandoval Góes	457
<b>Utilizing Data from a Sensorless AC Variable Speed Drive for Detecting Mechanical Misalignments</b>	
S. Abusaad, A. Benghozzi, Y.M. Shao, F.S. Gu and A. Ball	465
<b>Bearings Fault Detection in Gas Compressor in Presence of High Level of Non-Gaussian Impulsive Noise</b>	
T. Barszcz, R. Zimroz, J. Urbanek, A. Jabłoński and W. Bartelmus	473
<b>Concordia Transform-Based Current Analysis for Induction Motor Diagnosis</b>	
J.J. Wang, R.X. Gao and R.Q. Yan	481
<b>The Fault Characteristics of Planetary Gear System with Tooth Breakage</b>	
Y. Gui, Q.K. Han, Z. Li, Z.K. Peng and F.L. Chu	489

<b>Spalling Size Evaluation of Rolling Element Bearing Using Acoustic Emission</b> A.B. Ming, Z.Y. Qin, W. Zhang and F.L. Chu	497
--	-----

## **Chapter 4: Renewable Energy**

<b>In-Service Measurement of the Small Wind Turbine Test Stand for Structural Health Monitoring</b> M. Luczak, S. Manzato, M. Kahsin, D. Potok, M. Rozycki, D. Sporna and B. Peeters	507
<b>Rapid Assembly of Multifunctional Thin Film Sensors for Wind Turbine Blade Monitoring</b> L.P. Mortensen, D.H. Ryu, Y.J. Zhao and K.J. Loh	515
<b>Virtual Structural Monitoring of Wind Turbines Using Operational Modal Analysis Techniques</b> E. di Lorenzo, S. Manzato, B. Peeters and H. van der Auweraer	523
<b>Non-Linear Aeroelastic Stability of Wind Turbines</b> Z.L. Zhang, M.T. Sichani, J. Li, J.B. Chen and S.R.K. Nielsen	531
<b>Fatigue Analysis of Offshore Wind Turbines on Fixed Support Structures</b> N. Alati, V. Nava, G. Failla, F. Arena and A. Santini	539
<b>Advanced Tools for Damage Detection in Wind Turbines</b> I. Antoniadou, N. Dervilis, R.J. Barthorpe, G. Manson and K. Worden	547
<b>Damage Identification in a Laboratory Offshore Wind Turbine Demonstrator</b> A. Gómez González, E. Zugasti and J. Anduaga	555
<b>Dynamic Responses of a Scaled Tension Leg Platform, Wind Turbine Support Structure in a Wave Tank</b> J. Murphy, R. O'Shea, K. O'Sullivan and V. Pakrashi	563
<b>Simulation of the Stochastic Wave Loads Using a Physical Modeling Approach</b> W.F. Liu, M.T. Sichani, S.R.K. Nielsen, Y.B. Peng, J.B. Chen and J. Li	571
<b>Failure Analysis of Wind Turbines by Probability Density Evolution Method</b> M.T. Sichani, S.R.K. Nielsen, W.F. Liu, J.B. Chen, J. Li and Y.B. Peng	579
<b>Generalized Stochastic Constraint TARMA Models for In-Operation Identification of Wind Turbine Non-Stationary Dynamics</b> L.D. Avendaño-Valencia and S.D. Fassois	587
<b>Numerical Modeling to Aid in the Structural Health Monitoring of Wave Energy Converters</b> W. Finnegan and J. Goggins	595
<b>Modal Analysis for Crack Detection in Small Wind Turbine Blades</b> M.D. Ulriksen, J.F. Skov, K.A. Dickow, P.H. Kirkegaard and L. Damkilde	603
<b>Dynamic Stall on Rotating Airfoils: A Look at the N-Sequence Data from the NREL Phase VI Experiment</b> S. Guntur, N.N. Sørensen and S. Schreck	611
<b>Feature Selection - Extraction Methods Based on PCA and Mutual Information to Improve Damage Detection Problem in Offshore Wind Turbines</b> E. Zugasti, L.E. Mujica, J. Anduaga and F. Martínez	620
<b>On Structural Health Monitoring of Wind Turbine Blades</b> J.F. Skov, M.D. Ulriksen, K.A. Dickow, P.H. Kirkegaard and L. Damkilde	628
<b>On the Modeling of Spar-Type Floating Offshore Wind Turbines</b> V.N. Dinh and B. Basu	636
<b>Offshore and Onshore Wind Energy Conversion: The Potential of a Novel Multiple-Generator Drivetrain</b> N. Goudarzi and W.D. Zhu	644
<b>Monitoring Changes in the Soil and Foundation Characteristics of an Offshore Wind Turbine Using Automated Operational Modal Analysis</b> G. de Sitter, W. Weitjens, M. El-Kafafy and C. Devriendt	652
<b>Active Tuned Mass Damper Control of Wind Turbine Nacelle/Tower Vibrations with Damaged Foundations</b> B. Fitzgerald and B. Basu	660
<b>Active Blade Pitch Control for Straight Bladed Darrieus Vertical Axis Wind Turbine of New Design</b> P.D. Chougule, S.R.K. Nielsen and B. Basu	668

<b>Low-Cost Tower Root Fatigue Load Estimation for Structural Health Monitoring of Grouted Connections in Offshore Wind Turbines</b> N. Perišić and P.H. Kirkegaard	676
--	-----

## Chapter 5: Sensing and Sensors

<b>Damage Detection Using Electromechanical Impedance Technique Combined with Scanning Laser Vibrometry</b> S. Opoka, P. Malinowski, T. Wandowski, L. Skarbek and W. Ostachowicz	687
<b>Analyzing the Strain Sensing Response of Photoactive Thin Films Using Absorption Spectroscopy</b> D.H. Ryu and K.J. Loh	695
<b>Application of Piezo Sensors in EMI and Guided Wave Techniques</b> P. Malinowski, L. Skarbek and W. Ostachowicz	702
<b>Characterization of CFRP Using Laser Vibrometry</b> P. Malinowski, T. Wandowski and W. Ostachowicz	710
<b>Impact Localisation in Orthotropic Plates Using Flexural Wave Intensity Measurement</b> C.R. Halkyard and P. Masson	718
<b>Sensors and Methods for Blade Damage Operational Assessment in Low-Pressure Steam Turbine Stages</b> P. Procházka and F. Vaněk	726
<b>Interpolation Damage Detection Method on a Suspension Bridge Model: Influence of Sensors Disturbances</b> M. Domaneschi, M.P. Limongelli and L. Martinelli	734
<b>Compressive Sensing for Structural Damage Detection of Reinforced Concrete Structures</b> M. Jayawardhana, X.Q. Zhu, R. Liyanapathirana and U. Gunawardana	742
<b>Sensor Performance Assessment Based on a Physical Model and Impedance Measurements</b> I. Buethe and C.P. Fritzen	751
<b>The Status of Research on Self-Sensing Properties of CNT-Cement Based Composites and Prospective Applications to SHM</b> C. Rainieri, C. Pannunzio, Y. Song, G. Fabbrocino, M.J. Schulz and V. Shanov	759
<b>Vision-Based Sensing in Dynamic Tests</b> F. Casciati, S. Casciati and L.J. Wu	767
<b>Wireless Sensor Network for Helicopter Rotor Blade Vibration Monitoring: Requirements Definition and Technological Aspects</b> A. Sanchez Ramirez, K. Das, R. Loendersloot, T. Tinga and P. Havinga	775
<b>An Analysis of the Effectiveness of Application of Rotation Rate Sensors in Non Destructive Damage Evaluation</b> S. Kokot, Z. Zembaty and P. Bobra	783
<b>How Many Vibration Response Sensors for Damage Detection &amp; Localization on a Structural Topology? An Experimental Exploratory Study</b> C.S. Sakaris, J.S. Sakellariou and S.D. Fassois	791
<b>Investigating the Flexural Behaviour of Foams at High Strain Rate Using Optical Measurement Techniques</b> D.A. Crump and J.M. Dulieu-Barton	799
<b>Design and Validation of Embedded Piezoelectric Transducers for Damage Detection Applications in Concrete Structures</b> G. Karaiskos, S. Flawinne, J.Y. Sener and A. Deraemaeker	805
<b>Sensor Fusion on Structural Monitoring Data Analysis: Application to a Cable-Stayed Bridge</b> D. Zonta, F. Bruschetta, R. Zandonini, M. Pozzi, M. Wang, B. Glisic, D. Inaudi, D. Posenato and Y. Zhao	812

## Chapter 6: Signal Processing

<b>Damage Detection of a Substructure Based on Response Reconstruction in Frequency Domain</b> J. Li, S.S. Law and Y. Ding	823
---	-----

<b>Integrating Singular Spectrum Analysis with Damage Detection of Structure</b> S.S. Law and K. Liu	831
<b>A Two-Stage Scheme for Plate Damage Identification Based on Lock-in Thermography and Dynamic Analysis</b> H.Y. Gao, X.L. Guo, P.J. Hou, C.W. Wu and H.J. Ouyang	839
<b>Damage Detection in a Glass Plate Using Outlier Analysis</b> K. Yang, K. Worden and J.A. Rongong	847
<b>Numerical Studies on Wavelet-Based Crack Detection Based on Velocity Response of a Beam Subjecting to Moving Load</b> W.W. Zhang, J. Geng, Z.L. Zhao and Z.H. Wang	854
<b>Two Dimensional Damage Localization Using the Interpolation Method</b> M.P. Limongelli	860
<b>Spatial Filter for Operational Deflection Shape Component Filtration</b> J. Wójcicki, K. Mendrok and T. Uhl	868
<b>Damage Detection in Nonlinear Structures Using Discrete-Time Volterra Series</b> S.B. Shiki, V. Lopes and S. da Silva	876
<b>Cointegration and the Empirical Mode Decomposition for the Analysis of Diagnostic Data</b> I. Antoniadou, E.J. Cross and K. Worden	884
<b>Application of the Hilbert-Huang Transform for Identification of Changes in Boundary Conditions of a Bridge Using Vibration Data due to Traffic</b> A. González and H. Aied	892
<b>Estimating Vibration-Fatigue-Life on Experimentally Acquired Data</b> M. Mrsnik, J. Slavič and M. Boltezar	900
<b>Damage Detection Using Cointegration Technique and Wavelet Analysis of the Post-Cointegrated Lamb Waves</b> P.B. Dao and W.J. Staszewski	908
<b>Damage Detection Using Principal Component Analysis Based on Wavelet Ridges</b> F. Gharibnezhad, L.E. Mujica, J. Rodellar and C.P. Fritzen	916
<b>Non-Linear Vibro-Acoustic Wave Modulations - Analysis of Different Types of Low-Frequency Excitation</b> A. Klepka, W.J. Staszewski, K. Dziedziech and F. Aymerich	924
<b>Monitoring Dynamic Structural Tests Using Image Deblurring Techniques</b> D.M.J. McCarthy, J.H. Chandler and A. Palmeri	932
<b>Extension of Lamb Waves Defect Location Techniques to the Case of Low Power Excitation by Compressing Chirped Interrogating Pulses</b> L. de Marchi, N. Testoni, A. Perelli and A. Marzani	940
<b>Unscented Kalman Filter for Non-Linear Identification of a New Prototype of Bidirectional Tuned Vibration Absorber: A Numerical Investigation</b> E. Matta, R. Ceravolo, A. de Stefano, A. Quattrone and L. Zanolli Fragonara	948
<b>Imaging and Characterizing Structural Defects through the Estimation of Local Dispersion Curves</b> E.B. Flynn, G.S. Jarmer, S.Y. Chong and J.R. Lee	956
<b>Engine Assembly Quality Defect Inspection Based on EMD-Envelope Spectra</b> W.J. Ye and Y.M. Shao	962
<b>Real-Time Autonomous Structural Change Detection Onboard Wireless Sensor Platforms</b> R.S. Carbajo, E.S. Carbajo, B. Basu and C. McGoldrick	970
<b>Novel Approaches for Processing of Multi-Channels NDT Signals for Damage Detection in Conveyor Belts with Steel Cords</b> R. Blazej, L. Jurdziak and R. Zimroz	978
<b>Use of LU Decomposition of Modal Flexibility in Structural Damage Detection: Numerical Validation</b> Y.H. An and J.P. Ou	986

## **Chapter 7: Structural Health and Condition Monitoring**

<b>Real Human Hearing: Damage Detection and Monitoring of the Treatment Effectiveness</b> E.L. Ovchinnikov, V.V. Ivanov, Y.V. Ovchinnikova and P.V. Peskov	997
---	-----

<b>Ultrasonic Guided Wave Tomography for Damage Detection in Harsh Environment</b> J.D. Hua, L. Zeng, J. Lin and W. Shi	1005
<b>Detection and Quantitative Assessment of Damages in Beam Structures Using Frequency and Stiffness Changes</b> G.R. Gillich and Z.I. Praisach	1013
<b>Crack Location in Beams Using Wavelet Analysis</b> M. Solís, M. Algaba and P. Galvín	1021
<b>On the Use of Low and High Cycle Fatigue Damage Models</b> M. Abdel Wahab, I. Hilmy and R. Hojjati-Talemi	1029
<b>Synthetic Aperture Focusing Technique for Detecting Transverse Cracks in Austenitic and Dissimilar Welds</b> J. Prager, C. Höhne and M.U. Rahman	1036
<b>On the Integration of Real-Time Diagnosis and Prognosis for Scheduled Maintenance Optimization</b> C. Sbarufatti, A. Manes and M. Giglio	1044
<b>Smart Structural Health Monitoring Validated on a Simple Plate under Compressive Loading</b> C. Viechtbauer, K.U. Schröder and M. Schagerl	1052
<b>Analytical Modelling of Bond Strength Degradation due to Reinforcement Corrosion</b> J. Nepal, H.P. Chen and A.M. Alani	1060
<b>Investigation of Dynamic Response of a Railway Bridge Equipped with a Tailored SHM System</b> P. Kołakowski, A. Mroz, D. Sala, P. Pawłowski, K. Sekuła and A. Świercz	1068
<b>Influence of Physical Parameters and Operating Conditions for Structural Integrity of Mechanical System Subjected to Squeal Noise</b> K. Soobbarayen, S. Besset and J.J. Sinou	1076
<b>Operational Deflection Shape for Crack Detection in Structures</b> E. Asnaashari and J.K. Sinha	1085
<b>Vibration-Based Structural Health Monitoring of a Simulated Beam with a Breathing Crack</b> J. Kullaa, K. Santaoja and A. Eymery	1093
<b>Magnetic NDT and Computer Modeling of Steel Rope Deterioration in Suspended Bridges</b> A. Vorontsov, A. Zhirnov and D. Sukhorukov	1101
<b>Comparative Study of Robust Novelty Detection Techniques</b> N. Dervilis, R.J. Barthorpe and K. Worden	1109
<b>Vibration Methods of Damage Detection in Initially Symmetric Structures</b> V. Beresnevich and V. Jevstignejev	1116
<b>Anaerobic Corrosion of Reinforcement</b> R. O'Donovan, B.D. O'Rourke, K.D. Ruane and J.J. Murphy	1124
<b>Experimental Investigation on Improving Electromechanical Impedance Based Damage Detection by Temperature Compensation</b> T. Siebel and M. Lilov	1132
<b>Comparison of Full Field Strain Distributions to Predicted Strain Distributions from Limited Sets of Measured Data for SHM Applications</b> P. Avitabile, E. Harvey and J. Ruddock	1140
<b>Uncertainty Modeling and Quantification for Structural Health Monitoring Features Derived from Frequency Response Estimation</b> Z. Mao and M.D. Todd	1148
<b>Strength Assessment of Deteriorated OHL Conductors and Earth Wires Based on Non-Destructive Testing</b> V. Volokhovskiy, V. Sukhorukov and V. Tzukanov	1156
<b>Defect Detection Using Pulse Phase Thermography - Repeatability and Reliability of Data</b> R.C. Waugh, J.M. Dulieu-Barton and S. Quinn	1164
<b>Experimental Testing of a Cross-Entropy Algorithm to Detect Damage</b> A. González, E. Covián, M. Casero and J. Cooper	1170
<b>RFID Based Sensing for Structural Health Monitoring</b> M. Lisowski and T. Uhl	1178
<b>Energy Correlated Damage Indices in Fatigue Crack Extent Quantification</b> K. Dragan, M. Dziendzikowski, S. Klimaszewski, S. Klysz and A. Kurnyta	1186

<b>The Dynamic Behaviour of a Buried Water Pipe and its Effect on Leak Location Using Acoustic Methods</b>	
F. de Almeida, P. Joseph, M. Brennan, S. Whitfield and S. Dray	1194
<b>Wavespeed Measurement in Buried Water Distribution Pipes and its Significance in Leak Location</b>	
M. Brennan, F. de Almeida, P. Joseph, S. Dray and S. Whitfield	1202
<b>Assessment of Historic Structures Based on GPR, Ultrasound, and Impact-Echo Data Fusion</b>	
G. Safont, A. Salazar, L. Vergara, A. Vidal and A. Gonzalez	1210
<b>Structural Health Monitoring under Varying Environmental Conditions Using Wavelets</b>	
A. Tjirkallis, A. Kyprianou and G. Vessiaris	1218
<b>Damage Assessment in a Cracked Fiber-Reinforced Cantilever Beam Using Wavelet-Kurtosis Techniques</b>	
L. Montanari, B. Basu, A. Spagnoli and B. Broderick	1226
<b>Modelling of Piezo-Bond Structure System for Structural Health Monitoring Using EMI Technique</b>	
S.K. Bhalla and S. Moharana	1234
<b>Damage Detection of Shear Connectors Based on Power Spectral Density Transmissibility</b>	
J. Li and H. Hao	1241
<b>Multi-Technique Approach for the Assessment of Historical Masonry Constructions</b>	
F.M. Fernandes, L.F. Ramos, E. Manning, J. Ferreira and P. Mendes	1249
<b>Application of Multiple Objective Particle Swarm Optimisation in the Design of Damaged Offshore Mooring Systems</b>	
Z. Wang, T.J. McCarthy and M.N. Sheikh	1257
<b>A Compensation Method for Environmental Influences on Passive Lamb Wave Based Impact Evaluation for CFRP</b>	
K.J. Schubert and A.S. Herrmann	1265
<b>Detection and Localisation of Structural Damage Based on the Polynomial Annihilation Edge Detection: An Experimental Verification</b>	
C. Surace, M. Mattone and M. Gherlone	1273